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June 23, 2025

Mary Sharp, Esq.  
 Sharp Law Firm  
 1609 North Street  
 Beaufort, SC 29901

Re: Zane Richard Dickens vs. Orville Winston Barton and Winston Trucking, LLC

Dear Ms. Sharp,

I am a multi-state licensed, board-certified neurosurgeon, a Diplomate of the American Board of Neurological Surgery, and a Fellow of the American Academy of Neurological Surgeons. I serve as an Attending Physician at Carolina Neurosurgery & Spine Associates and in the Department of Neurological Surgery at Atrium Health. I am currently the Chief of Surgery at Atrium Cabarrus in Concord, North Carolina. As Core Faculty in the Carolinas Medical Center Neurological Surgery Residency Program, I teach both neurosurgery and orthopedic surgery residents, as well as rotating medical students and sub-interns.

I specialize in complex and minimally invasive spinal surgery. I have published over 40 peer-reviewed manuscripts, the majority of which are directly related to spine surgery. As a recognized expert in degenerative, traumatic, oncologic, and other pathologic conditions of the spine, I have given dozens of lectures and served as course faculty, symposium moderator, and course director for industry sponsored and accredited CME courses related to spine surgery. In addition, I act as a neurosurgical and spine surgery expert reviewer for the North Carolina State Medical Board. A copy of my current curriculum vitae is attached hereto as "Exhibit A." A summary of my qualifications, including a list of my publications in the past 10 years and a list of other cases in which I have testified as an expert in the past 4 years, is attached hereto as "Exhibit B."

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I am familiar with the standard of care for the practice of medicine related to the evaluation of spinal injuries, assessment of spinal conditions, and spinal neurosurgery in the United States, and specifically in South Carolina in 2024 and 2025.

I have reviewed the medical records for Zane Richard Dickens from Effingham Hospital on January 15, 2024, the Georgia Pain and Wellness Center, LLC (currently re-named as Summit Spine and Joint Centers) from June 14, 2024 to April 1, 2025. In addition, I directly reviewed the MRI of the Cervical Spine without contrast performed on June 28, 2024. I have also reviewed the South Carolina Traffic Collision Report dated January 13, 2024. My opinions are based on my education and training, my knowledge of the relevant neuroanatomy, the current medical literature, my experience and expertise in the field of neurological surgery, and my understanding of the facts of this case.

#### Clinical History

The records reflect that on January 13, 2024, Mr. Dickens was involved in a motor vehicle accident in which he stopped his vehicle due to heavy traffic and was struck in a rear-end collision. There was no airbag deployment and there was no documented injury to the driver of either vehicle or any of the passengers. No party was transported for medical evaluation. On January 15, 2024 (two days after the accident), Mr. Dickens presented to Effingham Hospital complaining of neck and right shoulder pain with onset the day after the motor vehicle accident. He obtained minimal relief with Motrin. He was ambulatory and had a normal neurologic exam at this visit with some right paraspinal cervical tenderness and tenderness to palpation over the right shoulder. X-rays of the right shoulder were performed and were read as negative for any evidence of acute bony injury.

Mr. Dickens is next evaluated on June 14, 2024, at the Georgia Pain and Wellness Center (now the Summit Spine and Joint Centers). There were no records documenting any further medical evaluation or treatment during the 5-month intervening period. Mr. Dickens was referred for evaluation at this time by the law office of Morgan and Morgan.

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His intake form documents Arthritis since 2013. It is documented that the patient is now experiencing ongoing pain since the automobile accident on January 13. He is now describing neck pain radiating to the bilateral shoulders and back pain radiating to the bilateral hips and feet. This pain is rated as a 3/10. He has utilized a home exercise program, ibuprofen, and stretching. He is screened for depression and has a score consistent with severe depression. He has a normal neurologic examination. He is diagnosed with low back pain and cervicalgia (neck pain).

An MRI of the cervical spine is ordered and was performed on June 28, 2024. This MRI demonstrated mild degenerative pathology with no evidence of spinal cord or nerve root displacement or compression at any segment. There are very small disc bulges at C5-6 and C6-7. The radiologist documents in the MRI report findings consistent with acute injury at these two spinal levels.

Mr. Dickens is next evaluated on August 13, 2024. He has a normal neurologic examination at this visit consistent with his prior exam, however, a positive Spurling maneuver is now documented without laterality. In addition to cervicalgia, he is also now diagnosed with Other cervical disc displacement, unspecified cervical region, Radiculopathy, cervical region, and Person injured in unspecified motor-vehicle accident, traffic, sequela.

From August 2024 through April 2025, Mr. Dickens underwent treatment including topical and oral non-steroidal anti-inflammatory medications, opiate pain medications, physical therapy, home exercise program, and two cervical epidural steroid injections. There is no documentation of the response to the initial cervical epidural injection. The second cervical injection was performed on March 17, 2025 and an 80% improvement is documented at follow-up. The last clinical visit note available for review is dated April 1, 2025

It is my opinion that there is no evidence of an acute injury related to the motor vehicle accident on January 13, 2024.

1. Mr. Dickens was seen on January 15, 2024 in the Effingham Hospital Emergency Department and appropriately diagnosed with cervical muscle strain and right shoulder pain.

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2. At no time in the initial January 15, 2024 medical evaluation nor in any of the subsequent medical evaluations was there any evidence of significant or acute injury to the cervical spine that would require prolonged or continued treatment.
3. The MRI of the Cervical Spine performed on June 28, 2024 had findings consistent with normal mild degenerative changes and mild disc bulging. This MRI was without evidence of acute disc injury, ligamentous injury, muscle edema, or any other radiographic stigmata of acute cervical injury.
4. The MRI of the Cervical Spine performed on June 28, 2024 showed no evidence of significant central or neuroforaminal stenosis, spinal cord compression or impingement, or nerve root compression.
5. The MRI of the Cervical Spine performed on June 28, 2024 failed to demonstrate any evidence of nerve root compression or displacement expected to be concordant with a diagnosis of cervical radiculopathy.
6. There is no documented evidence of objective findings of neurologic deficit at any clinical visit, including, but not limited to weakness, numbness, or dysreflexia.
7. There is no evidence of any condition, incident to or independent of the motor vehicle accident on January 13, 2024 that was warrant or require more invasive intervention, including but not limited to surgery.
8. There is no evidence of any transient or permanent neurological deficit, nor is there any evidence of any persistent or permanent harm related to the motor vehicle accident on January 13, 2024.

It is my professional medical opinion that there is no evidence of a significant or acute injury, aside from a transient mild cervical strain as a result of the motor vehicle accident that occurred on January 13, 2024.

I hold the above opinions to within a reasonable degree of medical certainty.

My opinions as stated herein are based on the information available to me at this time. I reserve the right to supplement and/or amend this opinion should other information or evidence become available.

I may use as exhibits any of the medical records or radiology studies including, MRI, CT, or x-rays pertaining to any treatment undergone by the Plaintiff.

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The fees charged for my participation in this matter include \$825 per hour for review of the medical records and \$825 for preparation of this report. If my deposition is required, the charge is \$3,500 for the first hour, and \$1,950 an hour for every hour thereafter. If my testimony is required at trial, the charge is \$10,000 a day. A total of \$833.25 has been billed to date in this matter.

Sincerely,

Christopher M. Holland, M.D., Ph.D.  
 Neurosurgeon, Carolina Neurosurgery & Spine Associates  
 Chief of Surgery, Atrium Health Cabarrus  
 Adjunct Assistant Professor, Neurological Surgery, Wake Forest School of Medicine

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# EXHIBIT A

**CURRICULUM VITAE**  
**CHRISTOPHER M. HOLLAND, M.D., Ph.D., FAANS**

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**SUMMARY OF EXPERTISE**

I am a board-certified, fellowship-trained, complex and minimally invasive spinal neurosurgeon specializing in degenerative spinal conditions, spinal deformity correction, primary and metastatic spine tumors, spinal trauma, and artificial disc replacement. I teach courses in minimally invasive techniques, lateral spine approaches, and other advanced procedures to resident and attending surgeons nationally and internationally. I am a designated expert in Neurological Surgery and Spine Surgery for the North Carolina Medical Board. I am a Fellow of the American Association of Neurological Surgeons.

**CLINICAL PRACTICE**

2016-Present      Neurosurgeon, Complex and Minimally Invasive Spine Surgeon  
Carolina Neurosurgery & Spine Associates, LLC, Charlotte, NC

**POSTDOCTORAL TRAINING**

2015-2016      Fellowship, Complex and Minimally Invasive Spine Surgery  
University of Utah, Salt Lake City, UT

2014-2015      Chief Residency, Neurological Surgery  
Emory University, Atlanta, GA

2009-2014      Residency, Neurological Surgery  
Emory University, Atlanta, GA

**EDUCATION**

2001-2009      Ph.D. Boston University School of Medicine, Boston, Massachusetts  
Dissertation: "Context-based Morphometry of Diseases Affecting the  
Cerebral White Matter: Perfusion and its Implications for Brain  
Parenchymal Damage."

2001-2009      M.D. Boston University School of Medicine, Boston, Massachusetts

2000-2001      Harvard Extension School, Cambridge, Massachusetts  
Computer Science

1995-1999      B.S. Boston College, Chestnut Hill, Massachusetts  
Biology, Spanish Concentration

**LICENSURE AND CERTIFICATIONS**

11/23/2016	South Carolina State Medical Board
10/09/2015	North Carolina State Medical Board
05/04/2019	Board Certified, American Board of Neurological Surgery

**CLINICAL APPOINTMENTS**

2024-Present	Chief of Surgery Atrium Health Cabarrus, Concord, NC
2022-Present	Adjunct Assistant Professor, Neurological Surgery Wake Forest University School of Medicine, Winston-Salem, NC
2022-2023	Vice Chief of Surgery Atrium Health Cabarrus, Concord, NC
2018-2022	Regional Division Chief, NorthEast MSK/SpineFirst
2017-2022	Director, Neurological Surgery Atrium Health Cabarrus, Concord, NC
2017-2022	Neurological Surgery Trauma Liaison Atrium Health Cabarrus, Concord, NC

**CLINICAL COMMITTEES**

2017-Present	Trauma Outcomes Committee, Atrium Health Cabarrus
2017-Present	Neurosciences & Spine Clinical Optimization Sub-Group, Atrium Health Cabarrus
2017-Present	Perioperative Governance Committee, Atrium Health Cabarrus
2018-Present	Neurosurgery and Spine Leadership Committee, Atrium Health Cabarrus
2020-Present	Board Member, Cabarrus Healthcare Foundation
2021-Present	Chair, Physician Leadership Council, Atrium Health Cabarrus

**PROFESSIONAL APPOINTMENTS**

2022-2024	Joint Guidelines Review Committee American Association of Neurological Surgeons / Congress of Neurological Surgeons (AANS/CNS)
2019-Present	Course Director / Course Faculty CNS, Seattle Science Foundation (SSF), Globus, Medtronic



## PROFESSIONAL MEMBERSHIPS

- AANS/CNS Joint Spine Section
- American Association of Neurologic Surgeons
- Congress of Neurological Surgeons
- North American Spine Society
- North Carolina Spine Society
- Southern Neurosurgical Society

## HONORS AND AWARDS

- Physician of the Quarter, Atrium Health Cabarrus – 2022
- “We Love Our Doctors” Favorite Doctor, Cabarrus Healthcare Foundation – 2022
- Leadership Institute, Congress of Neurological Surgery – 2021
- MedTech Boston 40 Under 40 Healthcare Innovator – 2016
- CNS David Cahill Spine Fellowship – 2015
- Fellow, Dximity Professional Physician Network
- John and Sophie Prockop Memorial Lectureship, American Society of Neuroimaging – 2013
- Edward L. Spatz, MD Excellence in Neurosurgery Award, Boston University School of Medicine – 2009
- Christopher G. Goposchkin, MD Neurosurgery Prize, Boston University School of Medicine – 2009
- Arthur P. Gold Humanism Honor Society, Boston University School of Medicine – 2008
- NIH/NINDS Predoctoral Fellowship (F30), Boston University School of Medicine – 2006
- John J. Stanton Memorial Scholarship, Town of Arlington, MA – 2001
- J.T. Tai Fellowship Award, Town of Arlington, MA – 2001

## GRANT FUNDING

2006-2009	NIH/NINDS, Individual National Research Service Award F30 NS049808-01A2 “Anatomical Distribution of Pathology in MS” Role: Principal Investigator
2006-2007	Harvard Center for Neurodegeneration and Repair (HCNR) Clinical Research Pilot Grant “Evaluating continuous arterial spin labeling in the investigation of the role of perfusion in the evolution and repair of white matter lesions in multiple sclerosis” Role: Principal Investigator

## DOCTORAL DISSERTATION

**Holland, CM.** Context-based Morphometry of Diseases Affecting the Cerebral White Matter: Perfusion and its Implications for Brain Parenchymal Damage. Boston University School of Medicine, Department of Anatomy and Neurobiology, 2009.

## PEER REVIEWED PUBLICATIONS

1. Kozinska D, **Holland CM**, Krissian K, Westin C-F, Guttmann CRG. Analysis of geometrical relations between multiple sclerosis lesions and brain vasculature, in Medical Imaging 2004: Physiology, Function, and Structure from Medical Images, edited by Amir A. Amini, Armando Manduca, Proceedings of SPIE Vol. 5369 (SPIE, Bellingham, WA, 2004) 328-338.
2. Kozinska D, **Holland CM**, Krissian K, Westin CF, Guttmann CRG. A method for the quantitative analysis of the relationship between white matter pathology and the vascular architecture of the brain. *NeuroImage*, 2004. 22(4): p. 1671-1678.
3. Guttmann CRG, Meier D, **Holland CM**. Can MRI reveal phenotypes of multiple sclerosis? *Magnetic Resonance Imaging*, 2006. 24(4): p. 475-481.
4. Glanz BI, **Holland CM**, Amunwa E, Liptak Z, Houtchens M, Gauthier S, Khoury SJ, Guttmann CRG, Weiner HL. Cognitive dysfunction in patients with clinically isolated syndromes or newly diagnosed MS. *Multiple Sclerosis*. 2007 Sep;13(8):1004-10.
5. Csapo I, **Holland CM**, Guttmann CRG. Image registration framework for large-scale longitudinal MRI databases: strategy and validation. *Magnetic Resonance Imaging*, 2007. Jul;25(6): p. 889-93.
6. Polgar J, Havelick J, Li Q, Laurent N, Unalkat M, Matte D, Gruman Z, Haley P, Doenges E, **Holland CM**, Csapo I, Crowley C, Doyle M, Triscott M. Optimization of One-Stage Coagulation Factor Assays: Improved Accuracy and Precision over an Extended Linear Range. *Blood*. 2007 Nov;110(11): 3933.
7. **Holland CM**, Smith EE, Csapo I, Gurol ME, Brylka DA, Killiany RJ, Blacker D, Albert MS, Guttmann CRG, Greenberg SM. Spatial distribution of white matter hyperintensities in Alzheimer's disease, cerebral amyloid angiopathy, and healthy aging. *Stroke*. 2008 Apr;39(4):1127-33.
8. Brickman AM, Zahra A, Muraskin J, Steffener J, **Holland CM**, Habeck C, Borogovac A, Ramos MA, Brown TR, Asllani I, Stern Y. Reduction in cerebral blood flow in areas appearing as white matter hyperintensities on magnetic resonance imaging. *Psychiatry Research: Neuroimaging*. 2009 May 15;172(2):117-20.
9. Jefferson AL, **Holland CM**, Tate DF, Csapo I, Poppas A, Cohen RA, Guttmann CRG. Atlas-derived perfusion correlates of white matter hyperintensities in patients with reduced cardiac output. *Neurobiol Aging*. 2011 Jan;32(1):133-9.
10. **Holland CM**, Charil A, Csapo I, Liptak Z, Ichise M, Khoury SJ, Bakshi R, Weiner HL, Guttmann CRG. The relationship between normal cerebral perfusion patterns and white matter lesion distribution in 1,249 patients with Multiple Sclerosis. *J Neuroimaging*. 2012 Apr;22(2):129-136.
11. Howard, BM, Eshraghi SR, **Holland CM**, Refai D. Octyl-cyanoacrylate Skin Adhesive is Effective for Wound Closure in Posterior Spinal Surgery without Increased Risk of Wound Complications. *Clin Neurol Neurosurg*. 2014 Aug 2;125C:137-142.

12. **Holland CM**, Bass DI, Gary MF, Howard BM, Refai D. Thoracic Lateral Extracavitary Corpectomy for Anterior Column Reconstruction with Expandable and Static Titanium Cages: Clinical Outcomes and Surgical Considerations in a Consecutive Case Series. *Clin Neurol Neurosurg*. 2015 Feb 28;129:37-43.
13. Roy AK, Miller BA, **Holland CM**, Fountain AJ Jr., Pradilla G, Ahmad FU. Magnetic resonance imaging of traumatic injury to the craniovertebral junction: a case-based review. *Neurosurg Focus*. 2015;38(4): E3.
14. **Holland CM**, Moore MK, Valdivia J. Traumatic Spinopelvic Dissociation Following Fall from Height with Treatment Complicated by Degenerative Thoracic Scoliosis. *Spine J*. 2015; 15(5): 1150-1151.
15. Reisner A, Hayes L, **Holland CM**, Wrubel DM, Kebriaei MA, Geller R, Chern J. Pediatrics Opioid Overdose in a Child: Case Report and Discussion with Emphasis on Neurosurgical Implications. *J Neurosurg Pediatr*. 2015; Dec; 16(6):752-7.
16. Howard BM, **Holland CM**, Krieger DA, Ahmad FU. Open Reduction and Posterior Instrumented Spinopelvic Fixation for Traumatic Grade IV Lateral Spondylolisthesis of the Thoracolumbar Spine. *Spine J*. 2015; 15(7): 1700-1701.
17. **Holland CM**, Kebriaei MA, Wrubel DM. Posterior Cervical Fusion in a 3 Week Old Infant with a Severe Subaxial Distraction Injury. *J Neurosurg Pediatr*. 2016; Mar; 17(3):353-6.
18. **Holland CM**, McClure EW, Howard BM, Samuels OB, Barrow DL. Inter-hospital Transfer of Neurosurgical Patients to a High Volume Tertiary Care Center: Opportunities for Improvement. *Neurosurgery*. 2015 Aug; 77(2): 200-207.
19. Parker SL, McGirt MJ, Bekelis K, **Holland CM**, Davies J, Devin CJ, Atkins T, Knightly J, Groman R, Zyung I, Asher AL. The National Neurosurgery Quality & Outcomes Database Qualified Clinical Data Registry (QCDR): 2015 Measure Specifications and Rationale. *Neurosurg Focus*. 2015; Dec; 39(6): E4.
20. Bekelis K, McGirt MJ, Parker SL, **Holland CM**, Davies J, Devin CJ, Atkins T, Knightly J, Groman R, Zyung I, Asher AL. The Present and Future of Quality Measures and Public Reporting in Neurosurgery. *Neurosurg Focus*. 2015; Dec; 39(6): E3.
21. Turan, N, Baum GR, **Holland CM**, Ahmad FU, Henriquez OA, Pradilla G. Upper Nasopharyngeal Corridor for Transnasal Endoscopic Drainage of Petroclival Cholesterol Granulomas, Alternative Access in Conchal Sphenoid Patients. *J Neuro Surg Rep*. 2016; 77(01): e017-e022.
22. Howard BM, Rindler RS, **Holland CM**, Pradilla G, Ahmad FU. Management and Outcomes of Isolated Tentorial and Parafalcine ‘Smear’ Subdural Hematomas at a Level-1 Trauma Center: Is high acuity care necessary? *J Neurotrauma*. 2017 Jan 1; 34(1): 128-136.
23. Salehani AA, Baum GR, Howard BM, **Holland CM**, Ahmad F. Floating Thoracic Spine After Double, Non-contiguous Three Column Spinal Fractures. *World Neurosurg*. 2016 Jul 31; 91: 670-e7.



24. Ravindra VM, Guan J, **Holland CM**, Dailey AT, Schmidt MH, Godzik J, Hood RS, Ray WZ, Bisson EF. Vitamin D status in cervical spondylotic myelopathy: comparison of fusion rates and patient outcomes measures. A preliminary experience. *J Neurosurg Sci*. 2016 Sep 2; 60(3):
25. Lovasik BP, **Holland CM**, Howard BM, Baum GR, Rodts GE, Refai D. Anterior Cervical Discectomy and Fusion: Comparison of Fusion, Dysphagia, and Complication Rates between Recombinant Human Bone Morphogenetic Protein-2 and Beta-Tricalcium Phosphate. *World Neurosurg*. 2016 Jan 31; 97: 674-683.
26. **Holland CM**, Lovasik BP, Howard BM, McClure EW, Samuels OB, Barrow DL. Interhospital Transfer of Neurosurgical Patients: Implications of Timing on Hospital Course and Clinical Outcomes. *Neurosurgery*. 2016 Sep 1; 81(3): 450-457.
27. Guan J, **Holland CM**, Schmidt MH, Dailey AT, Mahan MA, Bisson EF. Association of low perioperative prealbumin level and surgical complications in long segment spinal fusion patients: a retrospective cohort study. *Int J Surg*. 2017 Mar 31; 39: 135-140.
28. **Holland CM**, Mazur MD, Bisson EF, Schmidt MH, Dailey AT. Trends in Patient Care for Traumatic Spinal Injuries in the United States: A National Inpatient Sample Study of the Correlations with Patient Outcomes from 2001 to 2012. *Spine*. 2017 Dec 15; 42(24): 1923-1929
29. Howard BM, **Holland CM**, Mehta CC, Tian G, Bray DP, Lamanna JJ, Malcolm JG, Barrow DL, Grossberg JA. Association of Overlapping Surgery with Patient Outcomes in a Large Series of Neurosurgical Cases. *JAMA Surg*. 2018 April 1; 153(4): 313-321.
30. Guan J, **Holland CM**, Ravindra VM, Bisson EF. Perioperative malnutrition and its relationship to length of stay and complications in patients undergoing surgery for cervical myelopathy. *Surg Neurol Int*. 2017 Dec 27; 8 (307).
31. Ravindra VM, Guan J, **Holland CM**, Dailey AT, Schmidt MH, Godzik J, Hood RS, Ray WZ, Bisson EF. Vitamin D status in cervical spondylotic myelopathy: comparison of fusion rates and patient outcome measures. *J Neurosurg Sci*. 2019 Feb; 63(1): 36-41.
32. Meier IB, Lao PJ, Gietl A, Vorburger RS, Gutierrez J, **Holland CM**, Guttman CRG, Meier D, Buck A, Nitsch RM, Hock C, Unschuld PG, Brickman AM. Brain areas with normatively greater cerebral perfusion in early life may be more susceptible to beta amyloid deposition in late life. *Cerebral Circulation – Cognition and Behavior*. 2020
33. Parish JM, **Holland CM**, Healy AT. Sprengel deformity with omovertebral bone encroaching the spinal canal causing progressive cervical myelopathy: A technical case report. *World Neurosurg*. 2021 Feb; 146: 163-165.
34. Hani U, Mulvaney GG, O'Brien MD, Jernigan S, Kim PK, **Holland CM**, McGirt MJ, Bohl MA. Patent Bibliometrics in Cranial Neurosurgery: The First Bibliometric Analysis of Neurosurgery's Technological Literature. *World Neurosurg*, 2022 Dec 27.
35. Monk SH, Rossi VJ, Atkins TG, Karimian B, Pfortmiller D, Kim PK, Adamson TE, Smith MD, McGirt MJ, **Holland CM**, Deshmukh VR, Branch BC. Minimally Invasive Transforaminal Lumbar Interbody Fusion in the Ambulatory Setting with an Enhanced Recovery After Surgery Protocol. *World Neurosurg*. 2023 Mar 1;171:e471-e477.

36. Monk SH, Hani U, Pfortmiller D, Smith MD, Kim PK, Bohl MA, Coric D, Adamson TE, **Holland CM**, McGirt MJ. Anterior cervical discectomy and fusion in the ambulatory surgery center versus inpatient setting: one-year cost-utility analysis. *Spine*. 2023 Feb 1;48(3):155-163.
37. Monk SH, O'Brien M, Perle S, Bohl MA, Finger F, Chewning SJ, **Holland CM**. Ten-year Experience of Skip Anterior Cervical Corpectomy and Fusion. *Int J Spine Surg*. 2023 Jan 12;8417.
38. Hani U, Monk SH, Pfortmiller D, Stanley G, Kim PK, Bohl MA, **Holland CM**, McGirt MJ. Effect of worker's compensation status on pain, disability, quality of life, and return to work after lumbar spine surgery: a one-year propensity-matched analysis. *J Neurosurg Spine*. 2023. In Press
39. Monk SH, Hani U, Pfortmiller D, Adamson TE, Bohl MA, Branch BC, Kim PK, Smith MD, **Holland CM**, McGirt MJ. Minimally Invasive Transforaminal Lumbar Interbody Fusion in the Ambulatory Surgery Center Versus Inpatient Setting: A One-Year Comparative Effectiveness Analysis. *Neurosurg*. In Press
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41. Hani U, Monk SH, Pfortmiller D, Stanley G, Kim PK, Bohl MA, **Holland CM**, McGirt MJ. Effect of worker's compensation status on pain, disability, quality of life, and return to work after anterior cervical discectomy and fusion: a one-year propensity score-matched analysis. *J Neurosurg Spine*. 2023 Jul 21; 39(6), 822-830.
42. Hani U, Chen JW, **Holland CM**, McGirt MJ, Kim PK, Chewning SJ, Bohl MA. Patent bibliometrics in spinal deformity: the first bibliometric analysis of spinal deformity's technological literature. *Spine Deformity*. 2023. 12(1), 25-33.
43. McGirt MJ, **Holland CM**, Farber SH, Zuckerman SL, Spertus MS, Theodore N, Pfortmiller DA, Stanley G. Remote cognitive behavioral therapy utilizing an in-home virtual reality toolkit (Vx Therapy™) reduces pain, anxiety, and depression in patients with chronic cervical and lumbar spondylitic pain: A potential alternative to opioids in multimodal pain management. *N Am Spine Soc J*. 2023 Oct 19; 16:100287.
44. Monk, SH Hani U, Stanley G, Pfortmiller DA, Kim PK, Bohl MA, **Holland CM**, McGirt MJ. Mental health comorbidities in worker's compensation patients and the effect on pain, disability, quality of life, and return to work after lumbar spine surgery. *J Neurosurg Spine*. 2024 Feb 23; 40(5): 562-569.
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## BOOK CHAPTERS

1. **Holland CM**, Bisson EF, Schmidt MH. Anterior Cervical Discectomy and Fusion. In Neurosurgical Operative Atlas: Spine and Peripheral Nerves, Third Edition. (Wolfla CE and Resnick DK). Thieme Publishers, New York. Ch 9; 2016.
2. Van Horn, TA, O'Brien M, **Holland CM**. Bone Void Fillers: Allograft. Spinoplastic Reconstruction. (Ropper, Winocour, et al). Thieme Publishers, New York. Ch 12, 2024.

## EDITORIALS, REVIEWS, AND OTHER PUBLICATIONS

1. **Holland CM**, Foley KT, Asher AL. Editorial: Can Big Data Bridge the Chasm? Issues, Opportunities, and Strategies for the Evolving Value-Based Healthcare Environment. Neurosurg Focus. 2015; Dec; 39(6): E2.

## INVITED LECTURES

1. **Holland CM**, Meier DM, Moss MB, Weiner HL, Guttmann CRG. Quantitative MRI Analysis of Lesion Burden and Brain Parenchymal Atrophy in Multiple Sclerosis. Henry I. Russek Student Achievement Day, March 2003.
2. **Holland CM**, Meier DM, Khoury SJ, Weiner HL, Guttmann CRG. Brain Parenchymal Compartments in Multiple Sclerosis. European Charcot Foundation Symposium: Preserve the Neuron: Brain Atrophy, axonal loss, remyelination and stem cells in MS. December 11-13, 2003, Lisbon, Portugal.
3. **Holland CM**, Smith EE, Csapo I, Gurol ME, Brylka DA, Guttmann, CRG, Greenberg SM. Conserved Patterns of White Matter Hyperintensity Distribution in Alzheimer's, Cerebral Amyloid Angiopathy, and Healthy Aging. International Society for Magnetic Resonance in Medicine (ISMRM) 2007 Annual Meeting. May 19-25, 2007, Berlin, Germany.
4. **Holland CM**, Glanz BI, Khoury SJ, Weiner HL, Guttmann CRG. Lesion and normal appearing white matter distributions in early multiple sclerosis. European Consortium for Treatment and Research in MS (ECTRIMS). October 10-14, 2007, Prague, Czech Republic.
5. **Holland CM**, Charil A, Csapo I, Liptak Z, Ichise M, Khoury SJ, Bakshi R, Weiner HL, Guttmann CRG. Perfusion context-based morphometry and white matter lesion distribution in 1,249 patients with multiple sclerosis. European Consortium for Treatment and Research in MS (ECTRIMS). October 10-14, 2007, Prague, Czech Republic.
6. **Holland CM**, Charil A, Csapo I, Bakshi R, Khoury SJ, Weiner HL, Guttmann CRG. Hemispheric symmetry and hand dominance in 1,172 patients with multiple sclerosis. European Consortium for Treatment and Research in MS (ECTRIMS). October 10-14, 2007, Prague, Czech Republic.
7. **Holland CM**, McClure EW, Howard BM, Barrow DL. Comprehensive Analysis of the Timing, Acuity, and Disposition of Inter-Hospital Transfers to the Neurological Surgery Service. Georgia Neurosurgical Society Spring Meeting. May 24-26, 2013, Sea Island, GA.



8. **Holland CM**, Reisner A. Narcotic Leukoencephalopathy in Children: Identification, Management, and Neurosurgical Implications. Georgia Neurosurgical Society Fall Meeting. December 6-8, 2013, The Ritz Carlton Lodge Reynolds Plantation, GA.
9. **Holland CM**, Kebriaei M, Wrubel D. Posterior Cervical Fusion in a 3 week old infant with Severe Fracture Dislocation Injury: A Case Report. Georgia Neurosurgical Society Spring Meeting. May 23-25, 2014, Sea Island, GA.
10. **Holland CM**, McClure EW, Howard BM, Samuels OB, Barrow DL. Inter-Hospital Transfer of Neurosurgical Patients to a High Volume Tertiary Care Center: Comprehensive Analysis and Opportunities for Process Improvement. Congress of Neurological Surgeons (CNS) Annual Meeting. October 18-22, 2014, Boston, MA.
11. **Holland CM**, Moore MK, Gupta SK, Valdivia J, Pradilla G. Traumatic Spinopelvic Dissociation: Review of the Neurosurgical Management and Case Presentations. Georgia Neurosurgical Society Fall Meeting. December 5-7, 2014, The Ritz Carlton Lodge Reynolds Plantation, GA.
12. **Holland CM**, Roy A, Gross RE. Spinal Subdural Hematoma. Georgia Neurosurgical Society Spring Meeting. May 22-24, 2015, Sea Island, GA.
13. **Holland CM**, Bisson EF, Schmidt MH, Dailey AT. Decentralization of Spine Care in the United States from 2001 to 2012: Patient Outcome Correlations. Southern Neurosurgical Society Annual Scientific Meeting. March 3-5, 2016, San Antonio, TX.
14. **Holland CM**, Lovasik BA, Howard BM, Baum GR, Refai D, Rodts GE. Anterior Cervical Discectomy and Fusion: Comprehensive Comparison of Fusion and Complication Rates between Recombinant Human Bone Morphogenetic Protein-2 and Beta-Tricalcium Phosphate. Annual Meeting of the Section on Disorders of the Spine and Peripheral Nerves: Spine Summit 2016. March 19, 2016, Orlando FL.
15. **Holland CM**. Novel Approaches to Cervical Spine Trauma. Advancing Innovation and Outcomes in Neurological Surgery II. October 5, 2016, Charlotte, NC.
16. **Holland CM**. Visualized Access through an LLIF Approach. Southern Neurosurgical Society Annual Meeting. February 24, 2017, Orlando, FL.
17. **Holland CM**. Elevate<sup>TM</sup>Expandable Interbody Device. Controlled Expansion and Variable Lordosis for Your Posterior Fusion Procedures. Spine "Cage Match" Workshop. Southern Neurosurgical Society Annual Meeting. March 2, 2018, Marco Island, FL.
18. **Holland CM**. Pre-operative Management of Spine Co-Morbidities. Luncheon Seminar T16: Peak Performance: Optimizing the Spine Surgical Patient from Preop to Postop. Congress of Neurological Surgeons Annual Meeting. October 9, 2018, Houston, TX.
19. **Holland CM**. Pre-operative Management of Spine Co-Morbidities. Luncheon Seminar T16: Peak Performance: Optimizing the Spine Surgical Patient from Preop to Postop. Congress of Neurological Surgeons Annual Meeting. October 22, 2019, San Francisco, CA.
20. **Holland CM**. Direct Lateral, Pre-Psoas Approach to the Thoracolumbar Spine. Georgia Neurosurgical Society Spring Meeting. May 29, 2021, Sea Island, GA.

21. **Holland CM.** MIS+: A Better MIS TLIF. Medtronic National Sales Meeting. August 11, 2021, Dallas, TX.
22. **Holland CM.** Why Minimally-Invasive Spine Surgery: My Journey. The ABCs to MIS Spine Surgery. August 13, 2021, Singapore.
23. **Holland CM.** The Evolution of an Early Practice Spine Surgeon. May 19, 2022. Emory University, Department of Neurological Surgery, Grand Rounds, Atlanta, GA.
24. **Holland CM.** Evolution of the Next Generation of MIS TLIF: A Single Surgeon Experience. Georgia Neurosurgical Society Spring Meeting. May 28, 2022, Sea Island, GA.
25. **Holland CM.** Introduction of Excelsius3D. International Society for the Advancement of Spine Surgery 22<sup>nd</sup> Annual Meeting. June 1, 2022, Nassau, Bahamas.
26. **Holland CM.** The TLIF of Tomorrow. International Society for the Advancement of Spine Surgery 22<sup>nd</sup> Annual Meeting. June 2, 2022, Nassau, Bahamas.
27. **Holland CM.** The Rise of the Robots: Where are we now? Where are we going? Why it matters to you. International Society for the Advancement of Spine Surgery 22<sup>nd</sup> Annual Meeting. June 2, 2022, Nassau, Bahamas.
28. **Holland CM.** Prone Lateral, Is it ready for primetime adoption? International Society for the Advancement of Spine Surgery 22<sup>nd</sup> Annual Meeting. June 2, 2022, Nassau, Bahamas.
29. **Holland CM.** Graft Delivery Solutions for MIS Procedures. International Society for the Advancement of Spine Surgery 22<sup>nd</sup> Annual Meeting. June 3, 2022, Nassau, Bahamas.
30. **Holland CM.** MIS ALL Release is the new PSO. International Society for the Advancement of Spine Surgery 22<sup>nd</sup> Annual Meeting. June 4, 2022, Nassau, Bahamas.
31. **Holland CM.** Prone Lateral Interbody Fusion: Optimizing the Approach. Spine Technology, Education, and Discovery (STED) Lecture Series, Seattle Science Foundation. December 7, 2022, Seattle, WA (Virtual).
32. **Holland CM, Bohl MA.** Lumbosacral Osteolysis and Complex Reconstruction. Interesting Spine Case Conference Series, Seattle Science Foundation. May 23, 2023, Seattle, WA (Virtual).

#### **PROFESSIONAL COURSES - Course Director/Course Faculty**

- Globus: Current Trends & Surgical Solutions for Residents & Fellows, Audubon, PA – Apr 12, 2025
- Medtronic: South Area Comprehensive Spinal Solutions Course, Orlando, FL – March 1, 2025
- Globus: Lateral Solutions, Audubon, PA – November 2, 2024
- Globus: Lateral Spine Solutions, San Diego, CA – February 3, 2024
- Globus: Tricks of the Trade, Nashville, TN – June 3, 2023
- Medtronic: Navigated MIS TLIF and OLIF, Virginia Beach, VA – Oct 13-14, 2023
- Medtronic: Oblique Lateral Fusion and MIS TLIF with Space D, Charleston, SC – Sep 7, 2023
- SSF's 9<sup>th</sup> Annual Advanced Lateral Approaches Course, Seattle, WA – April 1, 2023
- Medtronic: Spine Tech Summit, Austin, TX – Feb 4, 2023

- SSF: Prone Lateral with Excelsius GPS®, Seattle, WA – Dec 7, 2022
- Medtronic: OLIF 360, Greenville, NC – Nov 3, 2022
- CNS: Different Permutations of Lateral Access, San Francisco, CA – Oct 9, 2022
- Globus: Latest Innovations in Advanced MIS Spine Surgery, Boston, MA – Sep 17, 2022
- Medtronic: Navigated Oblique Lateral for L2-S1 and MIS TLIF, Buffalo, NY – Aug 4, 2022
- Medtronic: Oblique Lateral for L2-S1, Greensboro, NC – May 18, 2022
- Medtronic: Spine Tech Summit, Austin TX – Mar 5, 2022
- Medtronic: TLIF of Tomorrow, Las Vegas, NV – Feb, 25 2022
- Globus: Transpsoas & Anterior-to-Psoas Approaches (L2-L5), Miami, FL – Jan 22, 2022
- Medtronic: Navigated MIS Surgery, Jacksonville, FL – Jan 7, 2022
- Globus: Lateral Access Surgery: Transpsoas vs Anterior-to-Psoas, Miami, FL – Nov 20, 2021
- Medtronic: Synergy-MIS+ A Better TLIF, Austin, TX – Oct 19, 2021
- Medtronic: MIS/MAST TLIF, Jacksonville, FL – Sep 22, 2021
- Medtronic: The ABCs to MIS Spine Surgery, Singapore – Aug 13, 2021
- Globus: The Future of Posterior MIS Solutions, Audubon, PA – June 13, 2020
- Globus: Advanced Lateral Spine Reconstruction Surgery, Tampa FL – Mar 14, 2020
- Globus: Exploration of Traditional Lateral Surgery vs. ATP, Scottsdale, AZ – Feb 27, 2020
- Globus: Lateral Access Surgery, Miami, FL – Nov 9, 2019



# EXHIBIT B

## **Holland Qualifications**

### **Narrative:**

I am a multi-state licensed, board-certified neurosurgeon, a Diplomate of the American Board of Neurological Surgery, and a Fellow of the American Academy of Neurological Surgeons as well as the Congress of Neurological Surgery. I serve as an Attending Neurosurgeon at Carolina Neurosurgery & Spine Associates and in the Department of Neurological Surgery at Atrium Health. I am the Chief of Surgery at Atrium Cabarrus in Concord, North Carolina. As Core Faculty in the Carolinas Medical Center Neurological Surgery Residency Program, I teach both neurosurgery and orthopedic surgery residents, as well as rotating medical students and sub-interns.

I specialize in complex and minimally invasive spinal surgery and continue to be engaged in active, full-time neurosurgical practice. I have published over 40 peer-reviewed manuscripts, the majority of which are directly related to spine surgery. As a recognized expert in degenerative, traumatic, oncologic, and other pathologic conditions of the spine, I have given dozens of lectures and served as course faculty, symposium moderator, and course director for industry sponsored and accredited CME courses related to spine surgery. In addition, I act as a neurosurgical and spine surgery expert reviewer for the North Carolina State Medical Board.

I am familiar with the standard of care for the practice of medicine related to the evaluation of spinal injuries, assessment of spinal conditions, and spinal neurosurgery in the United States, and specifically in South Carolina in 2024 and 2025.

### **Publications in the past 10 years**

#### **Peer-reviewed Publications**

1. **Holland CM**, Bass DI, Gary MF, Howard BM, Refai D. Thoracic Lateral Extracavitary Corpectomy for Anterior Column Reconstruction with Expandable and Static Titanium Cages: Clinical Outcomes and Surgical Considerations in a Consecutive Case Series. Clin Neurol Neurosurg. 2015 Feb 28;129:37-43.
2. Roy AK, Miller BA, **Holland CM**, Fountain AJ Jr., Pradilla G, Ahmad FU. Magnetic resonance imaging of traumatic injury to the craniovertebral junction: a case-based review. Neurosurg Focus. 2015;38(4): E3.
3. **Holland CM**, Moore MK, Valdivia J. Traumatic Spinopelvic Dissociation Following Fall from Height with Treatment Complicated by Degenerative Thoracic Scoliosis. Spine J. 2015; 15(5): 1150-1151.
4. Reisner A, Hayes L, **Holland CM**, Wrubel DM, Kebriaei MA, Geller R, Chern J. Pediatrics Opioid Overdose in a Child: Case Report and Discussion with Emphasis on Neurosurgical Implications. J Neurosurg Pediatr. 2015; Dec; 16(6):752-7.
5. Howard BM, **Holland CM**, Krieger DA, Ahmad FU. Open Reduction and Posterior Instrumented Spinopelvic Fixation for Traumatic Grade IV Lateral Spondylolisthesis of the Thoracolumbar Spine. Spine J. 2015; 15(7): 1700-1701.

6. **Holland CM**, Kebriaei MA, Wrubel DM. Posterior Cervical Fusion in a 3 Week Old Infant with a Severe Subaxial Distraction Injury. *J Neurosurg Pediatr.* 2016; Mar; 17(3):353-6.
7. **Holland CM**, McClure EW, Howard BM, Samuels OB, Barrow DL. Inter-hospital Transfer of Neurosurgical Patients to a High Volume Tertiary Care Center: Opportunities for Improvement. *Neurosurgery.* 2015 Aug; 77(2): 200-207.
8. Parker SL, McGirt, MJ, Bekelis K, **Holland CM**, Davies J, Devin CJ, Atkins T, Knightly J, Groman R, Zyung I, Asher AL. The National Neurosurgery Quality & Outcomes Database Qualified Clinical Data Registry (QCDR): 2015 Measure Specifications and Rationale. *Neurosurg Focus.* 2015; Dec; 39(6): E4.
9. Bekelis K, McGirt MJ, Parker SL, **Holland CM**, Davies J, Devin CJ, Atkins T, Knightly J, Groman R, Zyung I, Asher AL. The Present and Future of Quality Measures and Public Reporting in Neurosurgery. *Neurosurg Focus.* 2015; Dec; 39(6): E3.
10. Turan, N, Baum GR, **Holland CM**, Ahmad FU, Henriquez OA, Pradilla G. Upper Nasopharyngeal Corridor for Transnasal Endoscopic Drainage of Petroclival Cholesterol Granulomas, Alternative Access in Conchal Sphenoid Patients. *J Neuro Surg Rep.* 2016; 77(01): e017-e022.
11. Howard BM, Rindler RS, **Holland CM**, Pradilla G, Amad FU. Management and Outcomes of Isolated Tentorial and Parafalcine ‘Smear’ Subdural Hematomas at a Level-1 Trauma Center: Is high acuity care necessary? *J Neurotrauma.* 2017 Jan 1; 34(1): 128-136.
12. Salehani AA, Baum GR, Howard BM, **Holland CM**, Ahmad F. Floating Thoracic Spine After Double, Non-contiguous Three Column Spinal Fractures. *World Neurosurg.* 2016 Jul 31; 91: 670-e7.
13. Ravindra VM, Guan J, **Holland CM**, Dailey AT, Schmidt MH, Godzik J, Hood RS, Ray WZ, Bisson EF. Vitamin D status in cervical spondylotic myelopathy: comparison of fusion rates and patient outcomes measures. A preliminary experience. *J Neurosurg Sci.* 2016 Sep 2; 60(3).
14. Lovasik BP, **Holland CM**, Howard BM, Baum GR, Rodts GE, Refai D. Anterior Cervical Discectomy and Fusion: Comparison of Fusion, Dysphagia, and Complication Rates between Recombinant Human Bone Morphogenetic Protein-2 and Beta-Tricalcium Phosphate. *World Neurosurg.* 2016 Jan 31; 97: 674-683.
15. **Holland CM**, Lovasik BP, Howard BM, McClure EW, Samuels OB, Barrow DL. Interhospital Transfer of Neurosurgical Patients: Implications of Timing on Hospital Course and Clinical Outcomes. *Neurosurgery.* 2016 Sep 1; 81(3): 450-457.



16. Guan J, **Holland CM**, Schmidt MH, Dailey AT, Mahan MA, Bisson EF. Association of low perioperative prealbumin level and surgical complications in long segment spinal fusion patients: a retrospective cohort study. *Int J Surg*. 2017 Mar 31; 39: 135-140.
17. **Holland CM**, Mazur MD, Bisson EF, Schmidt MH, Dailey AT. Trends in Patient Care for Traumatic Spinal Injuries in the United States: A National Inpatient Sample Study of the Correlations with Patient Outcomes from 2001 to 2012. *Spine*. 2017 Dec 15; 42(24): 1923-1929.
18. Howard BM, **Holland CM**, Mehta CC, Tian G, Bray DP, Lamanna JJ, Malcolm JG, Barrow DL, Grossberg JA. Association of Overlapping Surgery with Patient Outcomes in a Large Series of Neurosurgical Cases. *JAMA Surg*. 2018 April 1; 153(4): 313-321.
19. Guan J, **Holland CM**, Ravindra VM, Bisson EF. Perioperative malnutrition and its relationship to length of stay and complications in patients undergoing surgery for cervical myelopathy. *Surg Neurol Int*. 2017 Dec 27; 8 (307).
20. Ravindra VM, Guan J, **Holland CM**, Dailey AT, Schmidt MH, Godzik J, Hood RS, Ray WZ, Bisson EF. Vitamin D status in cervical spondylotic myelopathy: comparison of fusion rates and patient outcome measures. *J Neurosurg Sci*. 2019 Feb; 63(1): 36-41.
21. Meier IB, Lao PJ, Gietl A, Vorburger RS, Gutierrez J, **Holland CM**, Guttman CRG, Meier D, Buck A, Nitsch RM, Hock C, Unschuld PG, Brickman AM. Brain areas with normatively greater cerebral perfusion in early life may be more susceptible to beta amyloid deposition in late life. *Cerebral Circulation – Cognition and Behavior*. 2020
22. Parish JM, **Holland CM**, Healy AT. Sprengel deformity with omovertebral bone encroaching the spinal canal causing progressive cervical myelopathy: A technical case report. *World Neurosurg*. 2021 Feb; 146: 163-165.
23. Hani U, Mulvaney GG, O'Brien MD, Jernigan S, Kim PK, **Holland CM**, McGirt MJ, Bohl MA. Patent Bibliometrics in Cranial Neurosurgery: The First Bibliometric Analysis of Neurosurgery's Technological Literature. *World Neurosurg*, 2022 Dec 27.
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33. Monk, SH Hani U, Stanley G, Pfortmiller DA, Kim PK, Bohl MA, **Holland CM**, McGirt MJ. Mental health comorbidities in worker's compensation patients and the effect on pain, disability, quality of life, and return to work after lumbar spine surgery. *J Neurosurg Spine*. 2024 Feb 23; 40(5): 562-569.
34. Hani U, Farber SH, Pfortmiller D, Kim PK, Bohl MA, **Holland CM**, McGirt MJ. Comparison of transforaminal and posterior lumbar interbody fusion outcomes in patients receiving a novel allograft versus rhBMP-2: a radiographic and patient reported outcomes analysis. *J Neurosurg Spine*. 2024 May 17:1-10. Online ahead of print.

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**LEGAL WORK IN THE PAST 4 YEARS**

I have testified in 2 cases at trial, served as an expert in 3 cases that were settled pre-trial, and am actively involved in 5 ongoing legal cases.